Engineering Interpretations

Construction Material and Excavating

Soils are rated as sources for road fill, topsoil, sand, and gravel. Suitability ratings of good, fair, or poor are given for soils used as a source of road fill and topsoil. Ratings of probable and improbable are given for sand and gravel. A rating of probable means that on the basis of the available evidence, the source material is likely to be in or below the soil. A rating of improbable means that the source material is unlikely to be in or below the soil. The ratings for sand and gravel do not consider the quality of the source material because quality depends on how the source material is to be used.

Road Fill

Road fill consists of soil material that is excavated from its original position and used in road embankments elsewhere. The evaluations for road fill are for low embankments that generally are less than 6 feet in height and are less exacting in design than high embankments such as those along superhighways. The rating is given for the whole soil, from the surface to a depth of about 5 feet, based on the assumption that soil horizons will be mixed in loading, dumping, and spreading. Soils are rated as to the amount of material available for excavation, the ease of excavation, and how well the material performs after it is in place.

Sand

Sand as a construction material is usually defined as particles ranging in size from 0.074 mm (sieve #200) to 4.75 mm (sieve #4) in diameter. Sand is used in great quantities in many kinds of construction. Specifications for each purpose vary widely. The intent of this rating is to show only the probability of finding material in suitable quantity. The suitability of the sand for specific purposes is not evaluated. If the lowest layer of the soil contains sand, the soil is rated as a probable source regardless of thickness. The assumption is that the sand layer below the depth of observation exceeds the minimum thickness.

Gravel

Gravel as a construction material is defined as particles ranging in size from 4.76 mm (sieve #4) to 76 mm (3 inches) in diameter.

Gravel is used in great quantities in many kinds of construction. Specifications for each purpose vary widely. The intent of this rating is to show only the probability of finding material in suitable quantity. The suitability of the gravel for specific purposes is not evaluated. If the lowest layer of the soil contains gravel, the soil is rated as a probable source regardless of thickness. The assumption is that the gravel layer below the depth of observation exceeds the minimum thickness.

Topsoil

The term "topsoil" has several meanings. As used here, the term describes soil material used to cover an area so as to improve soil conditions for establishment and maintenance of adapted vegetation. Generally, the upper part of the soil, which is richest in organic matter, is most desirable; however, material excavated from deeper layers is also used. In this rating, the upper 40 inches of soil material is evaluated for use as topsoil. In the

borrow area, the material below 40 inches is evaluated for its suitability for plant growth after the upper 40 inches is removed. The soil properties that are used to rate the soil as topsoil are those that affect plant growth, the ease of excavation, loading, and spreading, and those that affect the reclamation of the borrow area.

This subsection includes:

• (a) Construction Materials and Excavating

Construction Materials and Excavating

Map symbol and soil name	Source for roadfi	11	 Source for sand 	l	Source for grave	el	Source for topsoi	1	 Shallow excavatio 	ons
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
6B: Sharpsburg	 Moderately limited ~shrink-swell (moderately limited)	0.45	Very limited -excess fines (thickest layer) -excess fines (bottom layer)	1.00	 Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00	 Limited ~too clayey (limited) 	0.99	Slightly limited ~cutbanks cave (slightly limited) ~too clayey (slightly limited)	0.29
10C2: Lagonda	 Limited ~shrink-swell (limited) ~wetness (slightly limited)	0.96	 Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)		 Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00	 Moderately limited ~too clayey (moderately limited) ~wetness (slightly limited)	 0.55 0.26 	 Very limited ~wetness (very limited) ~too clayey (moderately limited) ~cutbanks cave (slightly limited)	 1.00 0.60 0.29
11B: Grundy	 Very limited ~shrink-swell (very limited) ~wetness (moderately limited)	1.00	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00	 Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00	 Very limited ~too clayey (very limited) ~wetness (moderately limited)	 1.00 0.48	 Very limited ~wetness (very limited) ~too clayey (moderately limited) ~cutbanks cave (slightly limited)	 1.00 0.45 0.29
11C: Grundy	 Very limited ~shrink-swell (very limited) ~wetness (moderately limited)	 1.00 0.48	 Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00	 Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00	 Very limited ~too clayey (very limited) ~wetness (moderately limited)	 1.00 0.48 	 Very limited ~wetness (very limited) ~too clayey (moderately limited) ~cutbanks cave (slightly limited)	 1.00 0.45

Construction Materials and Excavating

Map symbol and soil name	Source for roadfi	11	 Source for sand	l	 Source for grave	el	Source for topsoi	1	 Shallow excavatio 	ons
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
12B2: Grundy	 Very limited ~shrink-swell (very limited) ~wetness (moderately limited)	 1.00 0.48	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00	 Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00	 Very limited ~too clayey (very limited) ~wetness (moderately limited)	 1.00 0.48 	 Very limited ~wetness (very limited) ~too clayey (moderately limited) ~cutbanks cave (slightly limited)	 1.00 0.45 0.29
12C2: Grundy	 Very limited ~shrink-swell (very limited) ~wetness (moderately limited)	 1.00 0.48	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00	 Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00	 Very limited ~too clayey (very limited) ~wetness (moderately limited)	 1.00 0.48 	 Very limited ~wetness (very limited) ~too clayey (moderately limited) ~cutbanks cave (slightly limited)	 1.00 0.45 0.29
13C2: Clarinda	 Very limited ~shrink-swell (very limited) ~wetness (moderately limited)	 1.00 0.48 	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00	 Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00	 Very limited ~too clayey (very limited) ~wetness (moderately limited)	 1.00 0.48 	 Very limited ~wetness (very limited) ~too clayey (moderately limited) ~cutbanks cave (slightly limited)	 1.00 0.60 0.29
14C: Lamoni	 Very limited ~shrink-swell (very limited) ~wetness (moderately limited)	1.00	Very limited -excess fines (thickest layer) -excess fines (bottom layer)	1.00	 Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00	 Limited ~too clayey (limited) ~wetness (moderately limited) 	 0.99 0.48 	 Very limited ~wetness (very limited) ~cutbanks cave (slightly limited) ~too clayey (slightly limited)	 1.00 0.29 0.27

Construction Materials and Excavating

Map symbol and soil name	Source for roadfi	11	 Source for sand 	l	 Source for grave 	el	 Source for topsoi 	1	 Shallow excavatio 	ons
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
15C2: Lamoni	 Very limited ~shrink-swell (very limited) ~wetness (moderately limited)	1.00	 -excess fines (thickest layer) -excess fines (bottom layer)	1.00	 Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00	 Very limited ~too clayey (very limited) ~wetness (moderately limited)	 1.00 0.48	 Very limited ~wetness (very limited) ~too clayey (moderately limited) ~cutbanks cave (slightly limited)	 1.00 0.42) 0.29
16D: Shelby	 Moderately limited ~shrink-swell (moderately limited)	 0.45 	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00	 Very limited ~excess fines (bottom layer) ~excess fines (thickest layer) 	1.00	Limited ~too clayey (limited) ~slope (limited)	0.64	 Limited ~slope (limited) ~cutbanks cave (slightly limited) ~too clayey (slightly limited)	0.63
16E: Shelby	 Moderately limited ~shrink-swell (moderately limited) ~slope (slightly limited)	 0.45 0.25	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00	 Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00	 very limited ~slope (very limited) ~too clayey (limited)	 1.00 0.64 	 Very limited ~slope (very limited) ~cutbanks cave (slightly limited) ~too clayey (slightly limited)	 1.00 0.29 0.08
17D2: Shelby	 Moderately limited ~shrink-swell (moderately limited)	 0.45 	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00	 Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00	Limited ~too clayey (limited) ~slope (limited)	0.64	 Limited ~slope (limited) ~cutbanks cave (slightly limited) ~too clayey (slightly limited)	0.63

Construction Materials and Excavating

Map symbol and soil name	Source for roadfi	11	 Source for sand 	l	 Source for grave 	el	Source for topsoi	1	 Shallow excavation 	ons
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value _	Rating class and limiting features	Value	Rating class and limiting features	Value
17E2: Shelby	Moderately limited ~shrink-swell (moderately limited) ~slope (slightly limited)	 0.45 0.25	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	 1.00 1.00	 Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00	 Very limited ~slope (very limited) ~too clayey (limited)	 1.00 0.64 	 Very limited ~slope (very limited) ~cutbanks cave (slightly limited) ~too clayey (slightly limited)	 1.00 0.29 0.08
19C: Ladoga	 - Moderately limited ~shrink-swell (moderately limited)	 0.45 	 Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00	 Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00	 Limited ~too clayey (limited) 	 0.99 	 Slightly limited ~cutbanks cave (slightly limited) ~too clayey (slightly limited)	0.29
20C2: Ladoga	1 -	 0.45 	Very limited -excess fines (thickest layer) -excess fines (bottom layer)	1.00	 Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00	 Limited ~too clayey (limited) 	 0.99 	 Slightly limited ~cutbanks cave (slightly limited) ~too clayey (slightly limited)	0.29
21D: Gara	Moderately limited ~shrink-swell (moderately limited)	 0.45 	 Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00	 Very limited ~excess fines (bottom layer) ~excess fines (thickest layer) 	1.00	 Limited ~slope (limited) ~too clayey (moderately limited) 	 0.63 0.58 	 Limited ~slope (limited) ~cutbanks cave (slightly limited) ~too clayey (slightly limited)	 0.63 0.29 0.05

Construction Materials and Excavating

Map symbol and soil name	 Source for roadfi: 	11	Source for sand		 Source for grave 	el	Source for topsoi	1	 Shallow excavation 	ons
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
21E: Gara	 Moderately limited ~shrink-swell (moderately limited) ~slope (slightly limited)	 0.45 0.25	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00	 Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00	 Very limited ~slope (very limited) ~too clayey (moderately limited) 	 1.00 0.58 	 Very limited ~slope (very limited) ~cutbanks cave (slightly limited) ~too clayey (slightly limited)	 1.00 0.29 0.05
22D2: Gara	 Moderately limited ~shrink-swell (moderately limited)	 0.45 	Very limited -excess fines (thickest layer) -excess fines (bottom layer)	 1.00 1.00 	 Very limited ~excess fines (bottom layer) ~excess fines (thickest layer) 	1.00	Limited ~slope (limited) ~too clayey (moderately limited)	 0.63 0.58 	 Limited ~slope (limited) ~cutbanks cave (slightly limited) ~too clayey (slightly limited)	 0.63 0.29 0.05
22E2: Gara	 Moderately limited ~shrink-swell (moderately limited) ~slope (slightly limited)	 0.45 0.25	Very limited -excess fines (thickest layer) -excess fines (bottom layer)	 1.00 1.00 	 Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00	 Very limited ~slope (very limited) ~too clayey (moderately limited) 	 1.00 0.58 	 Very limited ~slope (very limited) ~cutbanks cave (slightly limited) ~too clayey (slightly limited)	 1.00 0.29 0.05
23C: Armstrong	 Limited ~shrink-swell (limited) ~wetness (moderately limited)	0.99	Very limited -excess fines (thickest layer) -excess fines (bottom layer)	 1.00 1.00 	Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00	 Very limited ~too clayey (very limited) ~wetness (moderately limited) ~small stones (slightly limited)	 1.00 0.48 0.03	 Very limited ~wetness (very limited) ~too clayey (moderately limited ~cutbanks cave (slightly limited)	 1.00 0.36) 0.29

Construction Materials and Excavating

Map symbol and soil name	Source for roadfi	11	 Source for sand	ì	 Source for grave	el	 Source for topsoi 	1	 Shallow excavatio	ons
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
24C2: Armstrong	 Very limited ~shrink-swell (very limited) ~wetness (moderately limited)	 1.00 0.48	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00	 Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00	 very limited ~too clayey (very limited) ~wetness (moderately limited) ~small stones (slightly limited)	 1.00 0.48 0.03	 Very limited ~wetness (very limited) ~too clayey (moderately limited) ~cutbanks cave (slightly limited)	 1.00 0.36 0.29
25B: Pershing	 Very limited ~shrink-swell (very limited) 	 1.00 	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00	 Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00	 Very limited ~too clayey (very limited) 	 1.00 	 Limited ~wetness (limited) ~too clayey (moderately limited) ~cutbanks cave (slightly limited)	0.95
26C2: Pershing	 Very limited ~shrink-swell (very limited)	 1.00 	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00	 Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00	 Limited ~too clayey (limited) 	 0.99 	 Limited ~wetness (limited) ~cutbanks cave (slightly limited) ~too clayey (slightly limited)	0.95
33E: Vanmeter	Very limited ~slope (very limited) ~shrink-swell (limited) ~depth to bedrock (limited)	 1.00 0.96 0.66	Very limited -excess fines (thickest layer) -excess fines (bottom layer)	1.00	 Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00	Very limited ~slope (very limited) ~too clayey (limited) ~large stones (moderately limited)	 1.00 0.69 0.48	 Very limited ~slope (very limited) ~cutbanks cave (slightly limited) ~too clayey (slightly limited)	 1.00 0.29 0.10

Construction Materials and Excavating

Map symbol and soil name	Source for roadfi	Source for roadfill		Source for sand		el	Source for topsoi	1	Shallow excavation	ons
	Rating class and limiting features	Value 	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
44: Bremer	 Very limited ~shrink-swell (very limited) ~wetness (limited)	1.00	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00	 Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00	 Limited ~wetness (limited) ~too clayey (moderately limited)	0.86	 Very limited ~wetness (very limited) ~cutbanks cave (slightly limited) ~too clayey (slightly limited)	1.00 0.29 0.26
45: Humeston	 Very limited ~wetness (very limited) ~shrink-swell (very limited)	 1.00 1.00 	Very limited -excess fines (thickest layer) -excess fines (bottom layer)	1.00	 Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00	 Very limited ~wetness (very limited) ~too clayey (limited)	 1.00 0.99 	 Very limited ~wetness (very limited) ~cutbanks cave (slightly limited) ~too clayey (slightly limited)	 1.00 0.29 0.27
46: Arbela	 Very limited ~wetness (very limited) ~shrink-swell (slightly limited)	 1.00 0.25 	 Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00	 Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00	 Very limited ~wetness (very limited) ~too clayey (limited) ~too acid (slightly limited)	 1.00 0.91 0.30	 Very limited ~wetness (very limited) ~flooding (moderately limited ~cutbanks cave (slightly limited)	 1.00 0.60) 0.29
51: Kennebec	 Moderately limited ~shrink-swell (moderately limited) 	 0.45 	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00	 Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00	 Slightly limited ~too clayey (slightly limited) 	 0.17 	Limited ~wetness (limited) ~flooding (moderately limited ~cutbanks cave (slightly limited)	0.61

Construction Materials and Excavating

Map symbol and soil name	Source for roadfi	11	 Source for sand 	İ	Source for grave	el	Source for topsoi	1	 Shallow excavatio 	ons
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
52B: Olmitz	 - Moderately limited ~shrink-swell (moderately limited)	0.45	 Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00	 Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00	 Slightly limited ~too clayey (slightly limited) 	0.25	Slightly limited ~cutbanks cave (slightly limited) ~too clayey (slightly limited)	0.29
54: Zook	 - Very limited ~shrink-swell (very limited) ~wetness (moderately limited)	 1.00 0.48	 Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)		 Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00	 Limited ~too clayey (limited) ~wetness (moderately limited)	 0.85 0.48 	(very limited)	0.31
55: Colo	 - Very limited ~shrink-swell (very limited) ~wetness (moderately limited)	 1.00 0.48	 Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00	 Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00	 Limited ~too clayey (limited) ~wetness (moderately limited)	 0.64 0.48 	 Very limited ~wetness (very limited) ~flooding (moderately limited) ~cutbanks cave (slightly limited)	 1.00 0.60 0.29
56: Nevin	 - Moderately limited ~shrink-swell (moderately limited)	 0.45 	 Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00	 Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00	 Slightly limited ~too clayey (slightly limited) 	 0.18 	 Limited ~wetness (limited) ~cutbanks cave (slightly limited) ~too clayey (slightly limited)	0.95

Construction Materials and Excavating

Map symbol and soil name	 Source for roadfi: 	11	 Source for sand 	l	 Source for grave 	1	Source for topsoi	1	Shallow excavation	ns
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
57A: Colo	 Very limited ~shrink-swell (very limited) ~wetness (moderately limited)	1.00	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00	(bottom layer)	1.00	 Limited ~too clayey (limited) ~wetness (moderately limited)	0.64	 Very limited ~wetness (very limited) ~flooding (moderately limited) ~cutbanks cave (slightly limited)	 1.00 0.60 0.29
58: Wabash	 Very limited ~shrink-swell (very limited) ~wetness (very limited)	 1.00 1.00 	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00	 Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	 1.00 1.00 	 Very limited ~too clayey (very limited) ~wetness (very limited)	 1.00 1.00 	 Very limited ~wetness (very limited) ~flooding (moderately limited) ~too clayey (moderately limited)	0.60
66: Nodaway	 Moderately limited ~shrink-swell (moderately limited) 	 0.45 	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00	 Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	 1.00 1.00	 Not limited 	 	 Limited ~wetness (limited) ~flooding (moderately limited) ~cutbanks cave (slightly limited)	 0.61 0.60 0.29
88: Pits	 Not rated 	 	 Not rated 		 Not rated 		 Not rated 	 	 Not rated 	
M-W: Water	 Not rated 	 	Not rated		 Not rated 		 Not rated 	 	 Not rated 	

Construction Materials and Excavating

Map symbol and soil name	Source for roadfill		Source for sand		 Source for gravel		Source for topsoil		Shallow excavations	
	Rating class and limiting features	Value	Rating class and limiting features	Value 	Rating class and limiting features	Value 	Rating class and limiting features	Value	Rating class and limiting features	Value
W: Water	 Not rated 		 Not rated 		 Not rated 		 Not rated 		 Not rated 	
		. i		_ i				_i	 	_